

PROJECT CHARGE: 1702

PROJECT TITLE: FILTRATION PHYSICS

PROJECT LEADER: R. W. Dwyer

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#### CIGARETTE DESIGN

At Cliff Lilly's request we constructed cigarettes with special flavors. The flavors were recommended and provided by Rett Southwick. They were impregnated into 15 mm paper tubes which were inserted into tobacco rods near the filter end. The objective was to provide samples with conventional tobacco flavor on all but the last puffs. Both thymol glycoside and W.S. flavors were tested and found to provide dramatic last-puff flavor notes. The W.S. flavor in particular was not discernible until the coal reached the impregnated tube. This study is continuing. (Creamer, Dwyer)

Four samples of MUL cigarettes were prepared with paper tube inserts in the tobacco rods. Two samples contained hollow tubes of different dimensions, one contained solid tubes, and the fourth was a control. Light extinction measurements showed all samples to deliver similar amounts of TPM but their puff profiles differed significantly. These cigarettes will be smoked by in-house panelists to determine the optimum tube dimensions for early puff enhancement. The solid tube samples will be examined for flavor off-notes arising from the paper insert. (Creamer)

In cooperation with the New Products Development Project we are examining the physical properties of a variety of novel filters. These designs include paper filters, high crimp-density CA filters, and uniquely shaped CA filters. We are concentrating on the oval cigarette at this time. The exit smoke patterns of this cigarette and a control have been monitored with high-speed cinematography. There are significant differences between the smoke patterns of these samples at flow rates from 1000 to 2000 cc/min. Additionally, we are measuring their dilution and RTD behavior as functions of flow rate. The particle size distributions of the emerging smoke and the relative efficiencies of both filters are also being measured. (Fleming, Akers, Cox)

Test methods have been devised to accurately measure the role of cigarette wrapper dilution to the total cigarette dilution and RTD. A mathematical model of this contribution to smoke delivery has been derived. (Cox, Akers)

A detailed treatment of the effects of tipping paper and plug wrap porosity on filter ventilation is in progress with the Development Smoke Studies Project. A semiempirical technique was developed which allows the ventilation level of a cigarette to be predicted from the tipping paper RTD,

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the plug wrap porosity, and the filter and rod RTD's. Further samples are being prepared to extend the range of this method. (Dwyer, Cox, Akers)

A cooperative investigation of lit-cigarette ventilation and CO delivery is being performed with C. Harward and M. Parrish of the Analytical Research Division. We have characterized the effects of the coal RTD on dilution level of cigarettes on a puff-by-puff basis. A model of CO generation and diffusion through the rod wrapper has been formulated which shows excellent correlation with their CO delivery measurements. (Dwyer)

REFERENCES

C. H. Akers  
K. A. Cox  
R. M. Creamer  
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